SATISFICING SIGNALING: CORPORATE SOCIAL STRATEGY AND CERTIFIED MANAGEMENT STANDARDS

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ABSTRACT

I explore corporate use of environmental certified management standards (CMS). I propose that multi-plant firms with poor environmental performance seemingly respond to stakeholder pressures by adopting a CMS. However, this may merely be a "satisficing signal" because these firms will choose their better, not poorer, performing plants for adoption.

INTRODUCTION

Certified management standards have become omnipresent. An example of a standard that has enjoyed widespread diffusion is ISO 14001, which is a management standard that certifies a firm's environmental management practices. Signaling theory from economics offers a compelling explanation for the popularity of these certification schemes. When information asymmetries make it difficult for one party to assess the practices of another party, the informed party may use certification to communicate about the superiority of its practices (Spence, 1973).

Research on environmental certified management standards (CMS) indeed suggests that firms are more likely to certify their practices when information asymmetries with their stakeholders are high (Jiang & Bansal, 2003). Yet empirical irregularities indicate that there are limits to applying signaling theory to the analysis of environmental CMS. In particular, certified organizations often do not have better environmental performance (Andrews, Darnall, Gallagher, et al., 2001) and poor performers, rather than superior ones, tend to select into certification (King, Lenox, & Terlaak, 2005).

In this paper, I address this incomplete fit between signaling theory and the actual usage of environmental CMS by developing a framework of "satisficing signaling". I use the example of an environmental CMS to develop this framework. However, the framework is applicable to any CMS that aims at influencing and communicating about firm practices that are at least partially associated with positive external effects for society ("social" CMS).

HYPOTHESES DEVELOPMENT

I identify three aspects of social CMS that differentiate these standards from certification schemes typically analyzed by signaling theory, and argue how these aspects warrant the development of a modified signaling framework.

Changes in Underlying Attributes

Classic signaling theory assumes that the attribute about which the informed party signals is stable. In Spence's job market signaling model (Spence, 1973), education does not

significantly alter the productive capabilities of a student. This notion conflicts with the core idea of human capital theory that education augments natural abilities (Becker, 1965). Thus, while both theories agree that schooling earns a premium, human capital theory attributes this premium to the students' learned skills whereas signaling theory argues that the premium is a reflection of the diploma's signal about the students' innate skills. Empirical studies suggest that the premium paid to college graduates ultimately is a combination of the effect of human capital accumulation and of being recognized as having inherently higher productivity (e.g., Bedard, 2001).

Just as education both influences and is indicative of a student's capabilities, an environmental CMS may both influence and indicate about a firm's environmental performance. Environmental CMS outline best environmental practices that companies need to implement in order to receive certification. These practices are expected (Darnall & Edwards, 2006) and found (King et al., 2005) to reduce a firm's impact on the natural environment.

If certification with a CMS not only communicates about firm performance but also improves this performance, stakeholders -- who are "motivated by a desire to bring about changes in a targeted firm's behavior along some dimension of concern to the group" (Eesley & Lenox, 2006: 6) -- should be particularly likely to pressure firms with poor environmental performance into adopting a CMS. Of course, for stakeholders to focus their efforts on these firms they need to be able to identify such low performers. While information asymmetries may inhibit stakeholders to undertake fine-grained differentiations, data available from news reports, non-profit groups, governments likely provide sufficient information for stakeholders to differentiate between firms that have very good and very poor environmental performance. Thus, stakeholders should be able to identify and apply adoption pressures to heavy polluters such that I expect:

> *Hypothesis 1: Organizations with poor environmental performance are more likely to adopt an environmental CMS than organizations with good environmental performance.*

Internalizing the Benefits of Adopting a Social CMS

Signaling theory assumes that uninformed parties are willing to pay a premium to parties that reveal their attributes through signaling. In the case of an environmental CMS, however, a firm may be uncertain whether it will receive such premium in return for certifying with a CMS. This is because market participants may have a limited willingness to pay (WTP) for the provision of a public good such as environmental protection. (Note that certified firms may provide environmental protection either through <u>having</u> superior environmental performance or through <u>improving</u> their environmental performance). This is not to say that WTP always is zero – under certain conditions, both end consumers and industrial buyers may reward environmentally conscious firms (Reinhardt, 1998). However, the extent of this WTP often is unknown and furthermore likely remains below the costs of producing environmental protection.

The uncertainty of a market premium could be secondary if firms are able to receive an operational benefit, rather than a market benefit, for adopting an environmental CMS. This would be the case if best environmental practices improved firm operations. Research suggests that such effect is possible, but that it is conditional upon a myriad of factors including whether the firm pursues waste prevention versus waste treatment (King & Lenox, 2002), the degree to which environmental efforts are supported by upper management (Maharaj & Ramnath, 2005), and the ownership structure of the company (Russo & Fouts, 1997).

Thus, both the market benefits and operational benefits of adopting an environmental CMS are uncertain. Adoption costs, in contrast, are more concrete -- a firm is required to rearrange its practices or adopt new ones in order to comply with the CMS, and it needs to pay certification fees. This creates an interesting situation when considered in combination with the decision making structures in multi-plant firms.

Signaling in Multi-Tiered Decision Structures

Research suggests that the majority of companies adopt an environmental CMS because their parent company either required or encouraged them to do so (Darnall, 2003). Translated into the context of Spence's job-market signaling model, it may be the family head, rather than the student, who decides which of the family's children should attend college. If a multi-plant firm decides which of its plants to certify with an environmental CMS, which ones will it chose?

I argue that multi-plant firms will select a plant that has better environmental performance than other firm plants because minimizing adoption costs is important given the problems of internalizing the potential benefits of a social CMS. Choosing a better performing plant minimizes adoption costs because the plant may already have in place the practices required by the standard, thereby reducing the costs of otherwise needed rearrangements. Better performing plants may also have greater absorptive capacity which facilitates the implementation of new practices where needed.

A firm may furthermore minimize adoption costs by choosing a plant that operates in an industry with inherently smaller environmental impacts and where adherence to best environmental practices is less costly. Finally, a multi-plant firm may reduce adoption costs by choosing a plant with prior experience with CMS.

Note that the choice of a multi-plant firm likely looks different if it was certain that it could internalize the benefits of adopting an environmental CMS. If it expected CMS practices to improve its internal operations, it would have good business reasons to mandate adoption by its poorest performing plant because this plant could realize the greatest improvements at lowest costs. Similarly, a firm would choose a poor performing plant if it were certain that market participants were willing to pay a premium that fully and proportionally rewarded each unit of improvement. Yet, given the uncertainty about the operational benefits and market benefits of adopting an environmental CMS, multi-plant will seek to minimize adoption costs and I expect:

> *Hypothesis 2: Within multi-plant firms, organizations with good environmental performance are more likely to adopt an environmental CMS than organizations with poor environmental performance.*
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> *Hypothesis 3: Within multi-plant firms, organizations operating in cleaner industries are more likely to adopt an environmental CMS than organizations operating in dirtier industries.*
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> *Hypothesis 4: Within multi-plant firms, organizations with prior experience with CMS are more likely to adopt an environmental CMS than organizations without such prior experience.*

Simultaneous consideration of Hypotheses 1 through 4 suggests that while stakeholder pressures may cause lower performing organizations to adopt an environmental CMS (H1), the

uncertainty associated with the payoffs of adoption in combination with the decision making structure of multi-plant firms result in a situation in which certified organizations are better within-firm performers (H2), operate in cleaner industries (H3), and have prior experience with management standards (H4). I label this adoption pattern 'satisficing signaling': While poor performing organizations seemingly respond to stakeholder pressures by adopting and certifying best practices, these organizations are ultimately better within-firm performers. Yet certification by better performers conflicts with the interests of stakeholders who would rather see that the poorest performers adopted best environmental practices.

EMPIRICAL ANALYSIS

Sample

The sample consists of 5,215 facilities drawn from the population of U.S. manufacturing facilities from the years 1995 to 2002. The sample was constructed using data from U.S. EPA's Toxic Release Inventory (TRI), Dun & Bradstreet's directory of facilities, COMPUSTAT, the Bureau of Economic Analysis, the Census Bureau of Foreign Trade, and the QSU database of ISO 14001 and ISO 9000 certified facilities. The sample includes all facilities that report to the TRI and for which there was complete information for all relevant variables. My theory stipulates that firms can choose which of their plants to certify and the sample is therefore restricted to multi-plant firms that own three or more facilities.

Variables

Dependent variable. The dependent variable is the binary variable *Certification.* It takes on unity in the year that a facility certifies with the ISO 14001 environmental management standard.

Independent variables. *Facility Environmental Performance* tests H1. For each facility and year, I use TRI data to capture a facility's toxicity-weighted emissions. I normalize these emissions by industry and year so as to measure a facility's emissions relative to the emissions of other industry plants and I inverse the sign. C*leaner Firm Performer* tests H2. This binary variable takes on unity if a facility's (normalized) environmental performance is better than the average of the (normalized) environmental performances of all firm plants in that year. *In Cleaner Industry* tests H3. This binary variable takes on unity if a facility operates in an industry that is cleaner than the average industries of the other firm facilities. *ISO 9000 Certification* tests H4. It indicates for each facility and year whether the facility is certified with ISO 9000.

Control variables. *R&D Intensity* and *Export* capture the degree to which information asymmetries affect a plant's propensity to adopt ISO 14001. The former variable indicates a facility's industry's annual R&D intensity, whereas the latter indicates a facility's industry's percentage of exports of shipments. *Auto Supplier* and *Regulatory Stringency* control for the effect of coercive pressures. The former variable indicates whether a facility sells its products to an automobile manufacturer. The latter is the inverse of the logged aggregate emissions per state over the sum of the Gross State Product in four main polluting sectors. *Industry Certification* measures the influence of mimetic adoption pressures. It is the annual percentage of ISO 14001 certified facilities in each industry. *Relative Facility Size* is the logged and normalized (by industry and year) count of employees. *Firm Size* is the logged sum of the employees of all facilities belonging to a firm. I also include the binary variable *Publicly Held* and control for year fixed effects.

Analysis & Results

I analyze certification with ISO 14001 using a discrete time random effect logistic model. Table 1 reports results. Focusing on the fully specified Model 2 in Table 1, I find support for the hypothesis that plants with poorer environmental performance (relative to other industry plants) are more likely to certify with ISO 14001 (H1).

Table 1 about here

Results also indicate that plants with better environmental performance than other firm-plants are more likely certify with ISO 14001 (H2). Furthermore, the propensity for certification is greater for plants that operate in industries that are cleaner than the industries of other firm facilities (H3) and that have prior experience with a certified management standard (H4).

Model 3 includes industry fixed effects to test whether results are confounded by underlying industry-specific tendencies to certify. Model 4 is specified as a non-parametric partial-likelihood Cox-regression (with observations clustered on the facility level) to test whether results are robust to the log odds specification in previous models. Models 3 and 4 confirm the results for the independent variables in sign and significance. (Note that the coefficients in Model 4 represent hazard rates. Coefficients greater than unity indicate that the variable has a positive effect on adoption propensities).

CONCLUSIONS

I develop a framework of satisficing signaling to explain corporate use of social CMS. This framework considers (i) that implementation of CMS practices may change underlying firm attributes, (ii) that payoffs of adopting a social CMS are uncertain, and (iii) that multi-plant firms may behave strategically when they choose which of their plants to certify. I use the context of an environmental CMS to argue that the combination of these factors causes firms with poor performing plants to seemingly respond to stakeholder pressures by adopting an environmental CMS – however, this signal of responsible environmental behavior may merely be a satisficing one because these firms will choose their better performing plants, rather than their worst performers, for adopting and certifying best environmental practices. This conflicts with the interests of stakeholders who would rather see that plants with the lowest environmental performance adopted best environmental practices.

While signaling theory provides some important insights into the use of CMS, this paper suggests that only a few elements of the original signaling model may apply to the use of social CMS. As proposed by signaling theory, adoption and certification with a social CMS may help firms overcome information asymmetries with stakeholders. Yet contrary to signaling theory, the signaling action may actually change underlying firm attributes as CMS practices likely influence a firm's practices and performance in the area targeted by the standard. Furthermore, the premium associated with changing these underlying attributes is uncertain. This can result in a situation where a social CMS is neither a signal of (fixed) superior social performance nor a signal of efforts to improve firm social performance. Instead, a social CMS might run the risk of simply being a satisficing signal that firms employ to assuage stakeholder pressures without attempting to improve substantially their social performance.

REFERENCES AVAILABLE FROM THE AUTHOR

TABLE 1: Model Results

Variables	Model 1	Model 2	Model 3	Model 4
Facility Environmental Perf.		-0.160** (0.058)	-0.168** (0.059)	0.852** (0.046)
Cleaner Firm Performer		0.255* (0.113)	0.292* (0.115)	1.265* (0.133)
In Cleaner Industry		0.375*** (0.101)	0.267* (0.118)	1.402*** (0.134)
ISO 9000 Certification		0.557*** (0.100)	0.464** (0.104)	1.733*** (0.164)
R&D Intensity	9.273** (2.704)	8.815** (2.880)	10.215* (4.194)	3.941** (11.048)
Export	0.836 (0.842)	0.553 (0.866)	-0.208 (1.239)	1.964 (1.638)
Auto Supplier	1.404*** (0.130)	1.524*** (0.134)	24.772** (1.126)	4.309*** (0.508)
Regulatory Stringency	3.598 (2.909)	2.887 (2.933)	3.456 (3.191)	1.542 (4.003)
Industry Certification	0.071** (0.026)	0.064* (0.026)	-0.034 (0.034)	1.052* (0.022)
Relative Facility Size	0.377*** (0.056)	0.324*** (0.058)	0.381** (0.061)	1.359*** (0.071)
Firm Size	0.001** (0.000)	0.001** (0.000)	0.001* (0.001)	1.001*** (0.000)
Publicly Held	-0.254* (0.117)	-0.335** (0.118)	-0.312* (0.122)	0.720** (0.079)
Year Fixed Effects Industry Fixed Effects	Incl. -	Incl. -	Incl. Incl.	Incl. -
Chi-Square (df) Log Likelihood	641 (15)*** -1976.89	680 (19)*** -1949.89	1281 (91)*** -1853.49	753 (20)*** 1499.47

N = 36093
* = p<0.05; ** = p<0.01; *** = p<0.001. All tests are two tailed.